

# Defining Environmental Control Requirements for Laboratory Animal Facilities

Dan Frasier, PE



19 Tyler Road  
North Andover, MA 01845  
978-683-4552  
[www.CommissionHVAC.com](http://www.CommissionHVAC.com)

# Agenda

✍ Obtaining the Requirements

✍ Unique Issues

✍ Maximizing Results



# Obtaining the Requirements

## Capturing the Requirements

- ✍ Input from key people
- ✍ The most widely accepted references
- ✍ An effective process



# Obtaining the Requirements

## Involve the Right People

- ✍ Directors – usually a veterinarian
- ✍ Consulting veterinarian (re: regulations)
- ✍ Researchers or a liaison for them
- ✍ Laboratory animal managers / technicians
- ✍ Maintenance personnel
- ✍ Experienced design professionals (A/Es)



# Obtaining the Requirements

## Important References

✍ *"The Guide"*

[www.nap.edu](http://www.nap.edu)

✍ ASHRAE Handbooks

[www.ashrae.org](http://www.ashrae.org)

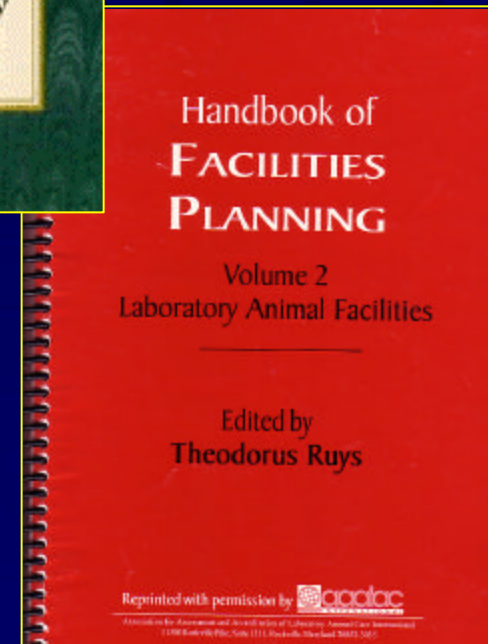
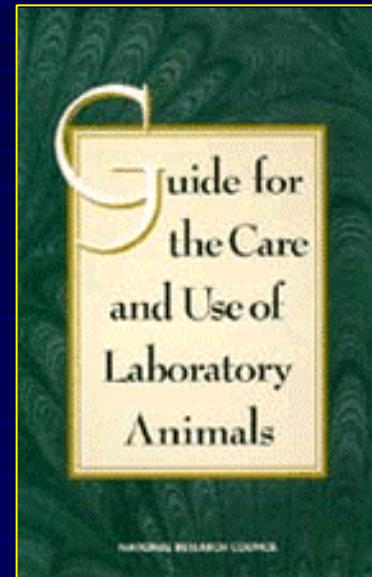
✍ Handbook of Facilities Planning

[www.aaalac.org](http://www.aaalac.org)

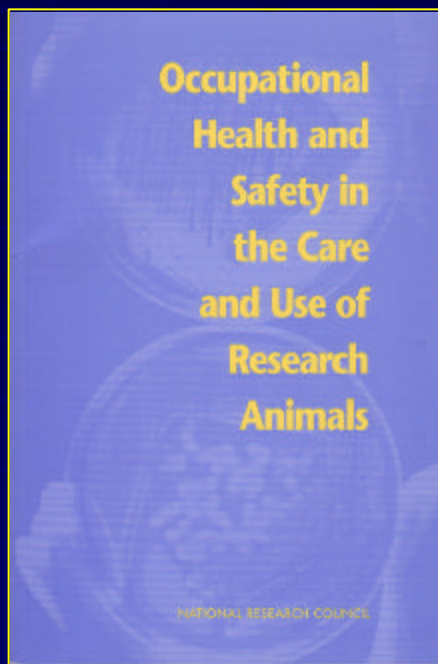
✍ ARS Facilities Design Standard

✍ Chapter 9: Biohazard Containment

✍ Chapter 10: Animal Facilities



# Obtaining the Requirements



*"Criteria for mechanical systems must be based on:*

- ✍ Reliability*
- ✍ Operational integrity*
- ✍ Projected length of service*
- ✍ Ease of maintenance"*

[www.nap.edu](http://www.nap.edu)

# Obtaining the Requirements

An Effective Process for  
Capturing the Requirements

Project Programming Phase  
+  
HVAC Commissioning Process

# Obtaining the Requirements

## Project Programming Phase

 Project Program Committee

*owner + architect / planners*

 AAALAC Program Description Committee



# Obtaining the Requirements

## The Commissioning Process

### *Methods for Capturing Project Requirements*

-  Review design documents
-  Review of program description
-  Project Intent workshop

# Obtaining the Requirements

## HVAC Commissioning Process

### Project Intent Workshop

#### *MOST EFFECTIVE METHOD*

- ✍ Uses Nominal Group Technique
- ✍ Uncovers a vast variety of needs
- ✍ Functional requirements
- ✍ Operational requirements
- ✍ Cost and problem avoidance

*Workshop can be supplemented  
by surveys and interviews.*





# Unique Issues

## AAALAC Accreditation



*Association for the Accreditation and Assessment of  
Laboratory Animal Care, International*

✍ Like a “Good Housekeeping stamp of approval”

✍ Site visits every 3 years

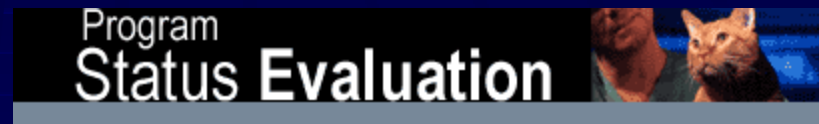
re: Compliance to Regulations, mostly *The Guide*

✍ Requires environmental monitoring

# Unique Issues

AAALAC Program Description defines:

- ✍ Air Source
- ✍ Air Treatment
- ✍ Ventilation Rate
- ✍ Temperature
- ✍ Relative Humidity
- ✍ Pressurization



# Unique Issues

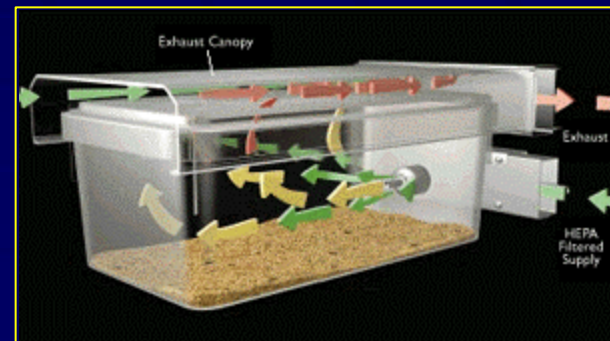
✍ Types of facilities

✍ Rodent

✍ Non-human primate

✍ Bio-containment  
(BSL-2, 3, 4)

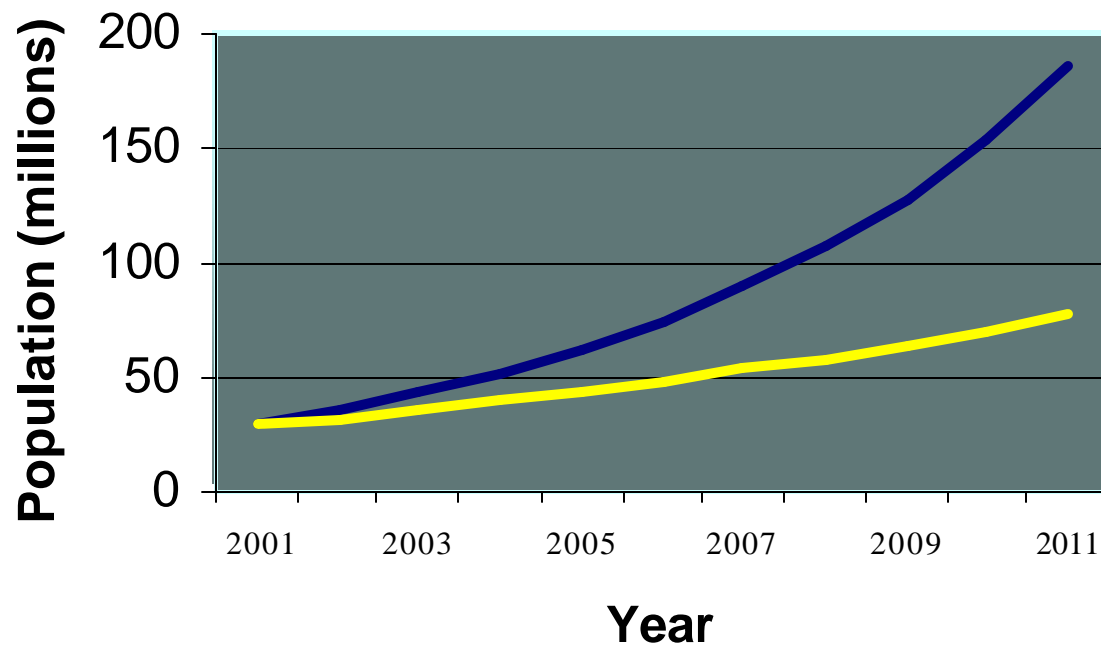
✍ Immuno-deficient  
animals



# Unique Issues

## Tremendous growth

Mouse Population Projections

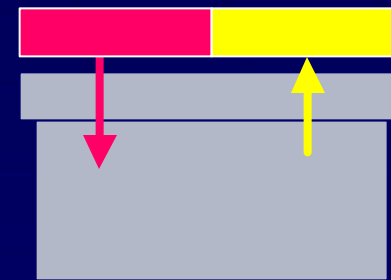
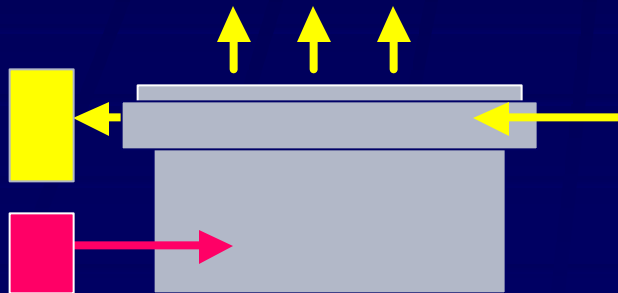
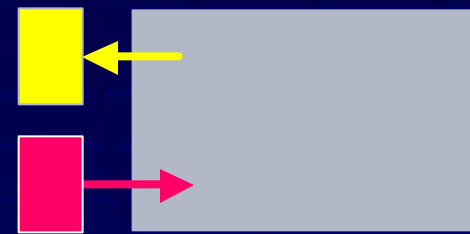
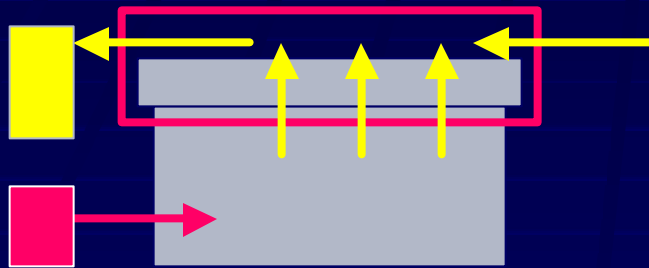


---- 20% ----  
annual growth

---- 10% ----  
annual growth

# Unique Issues

Large variety of rodent caging systems connecting to building systems



Difficult for an HVAC system to meet the needs of every type of caging system.

# Unique Issues

## Airflows (CFM) for 4 cage rack manufacturers

<u>Mfr.</u>	<u>Supply</u>	<u>Exhaust</u>
a.	12	36
b.	45	65
c.	60	90
d.	20	17





# Maximizing Results

## One Example of Energy Conservation

✍ NY State award for Green Design



- Ground Water Source Heat Pumps
- Heat Recovery Ventilator
- HVAC Commissioning

# Maximizing Results

## Understanding the Requirements

- ✍ Additional capacity
- ✍ Flexibility
- ✍ Specialty systems
- ✍ Automation



# Maximizing Results

## Implement the Commissioning Process

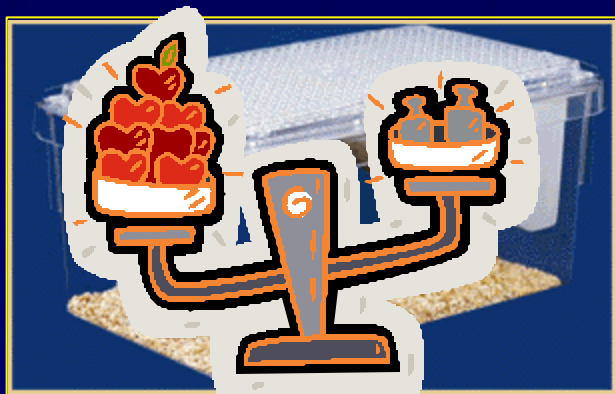
- ✍ Improves the quality of buildings
- ✍ Cost & problem avoidance
  - ✍ Reduces number of design changes
  - ✍ Reduces change orders



# Maximizing Results

## Benefits of the Commissioning Process

- ✍ Buildings meet owners needs
- ✍ Provides excellent benchmarks
- ✍ Reduced energy usage



*The benefits far outweigh the costs.*

# Defining Environmental Control Requirements for Laboratory Animal Facilities

## Questions?